

Indigent Pregnant Women of New Orleans Require Tuberculosis Control Measures

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WHEN DECLINING infection rates made tuberculosis control programs less productive and comparatively more expensive, public health agencies increased the attention directed toward the high-risk populations. However, finding and testing high-risk populations was sometimes difficult. Heretofore, sampling the indigent pregnant women of New Orleans had yielded little useful information. Inadequately standardized and coordinated methods of tuberculin testing and followup were partly responsible. But past failures also resulted from some women's refusal to cooperate.

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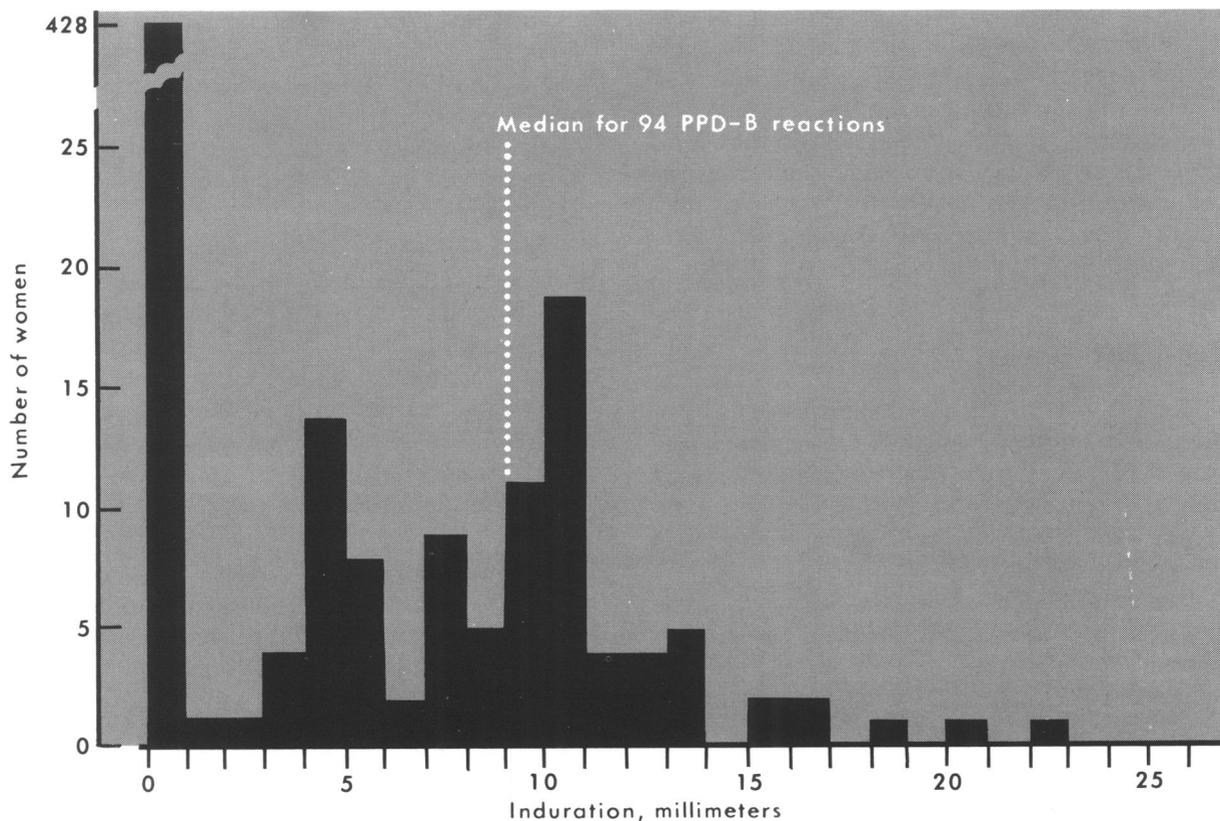
At present, social and welfare agencies operating from neighborhood health centers and well baby clinics bring almost all indigent pregnant women to prepartum clinics for tuberculosis testing. Moreover, Palmer and Edwards (1) have devised a dual (comparative) testing technique that helps distinguish persons with tuberculous infection from those infected only by the atypical mycobacteria that are indigenous in Louisiana and the other southeastern States.

To appraise the prevalence of tuberculous infection among the indigent pregnant women of New Orleans and to determine their need for special control measures, we used the dual (comparative) tuberculin test to sample indigent women who attended a prepartum clinic.

Sampling Procedure

From June 8 through August 3, 1970, 522 pregnant women (aged 15–40 years and chosen consecutively) who attended the Family Planning Clinic in New Orleans were tested intradermally with purified protein derivatives of *Mycobacterium tuberculosis* (PPD-T) and Battey strains of atypical mycobacteria (PPD-B). (The Tubercu-

Figure 2. Size and distribution of reactions of 522 pregnant women to 0.0001 mg PPD-B



would obtain from it. Testing was made as easy as possible for the women. Each skin test was performed promptly at a regularly scheduled clinic visit. Care was taken not to make the women wait for either the skin test or its interpretation. The followup visit (for interpretation) was always scheduled for 48 hours, rather than 72, to give the nurses time to contact women who did not appear. Only 16 women did not reappear on the scheduled day; they did come later at the nurses' urging.

Reactions of 107 pregnant women to PPD-B and PPD-T, by diameter of induration

PPD-B	PPD-T				Total women
	None	1-4 mm.	5-9 mm.	≥10 mm.	
None.....	0	1	1	11	13
1-4 mm....	18	0	0	2	20
5-9 mm....	28	1	5	1	35
≥10 mm...	31	1	0	7	39
Total women....	77	3	6	21	107

Moreover, the environment of the Family Planning Clinic was conducive to obtaining the women's cooperation. For example, they could relax at the clinic and converse with each other. Clinic personnel answered questions unhurriedly, and the social worker was available for counseling on personal problems as well as on means of securing assistance from Aid to Dependent Children and other welfare programs.

Following the recommendations of Edwards and Colton (2), two experienced nurses from the New Orleans Department of Health gave simultaneous intradermal PPD-T and PPD-B tests and kept records on each woman and her response. For every test, the nurses used a fresh disposable B-D Plastipak tuberculin syringe with a needle. They injected 0.1 ml. of PPD-T and 0.1 ml. of PPD-B, in concentrations of 0.0001 mg. per 0.1 ml., into the most superficial layer of each woman's skin. The PPD-T was injected on the flexor surface of the left forearm, midway between the wrist and elbow, and the PPD-B at a corresponding site on the right forearm. Unsatisfactory tests were repeated at distal sites.

The nurses, 2-4 days later, used dividers and a ruler to measure reactions to the nearest millimeter of induration. PPD-T reactions of 10 mm. or more in the longest diameter were considered positive, regardless of the size of the reactions to PPD-B. On the other hand, PPD-T reactions in the doubtful range, 5-9 mm., were considered positive only if they were larger than the corresponding reactions to PPD-B. PPD-T reactions smaller than 5 mm. were considered nontuberculous (3).

Tuberculin Testing

Tuberculous infection was identified in 25, or 4.8 percent, of the sample of 522 pregnant women who were tested by the dual (comparative) technique. None of the women with tuberculous infection had clinical or radiological evidence of tuberculous disease.

Dual tuberculin testing yielded measurable reactions in 107 of the 522 pregnant women; 415 women did not have measurable reactions to either PPD-T or PPD-B. The reactions of the

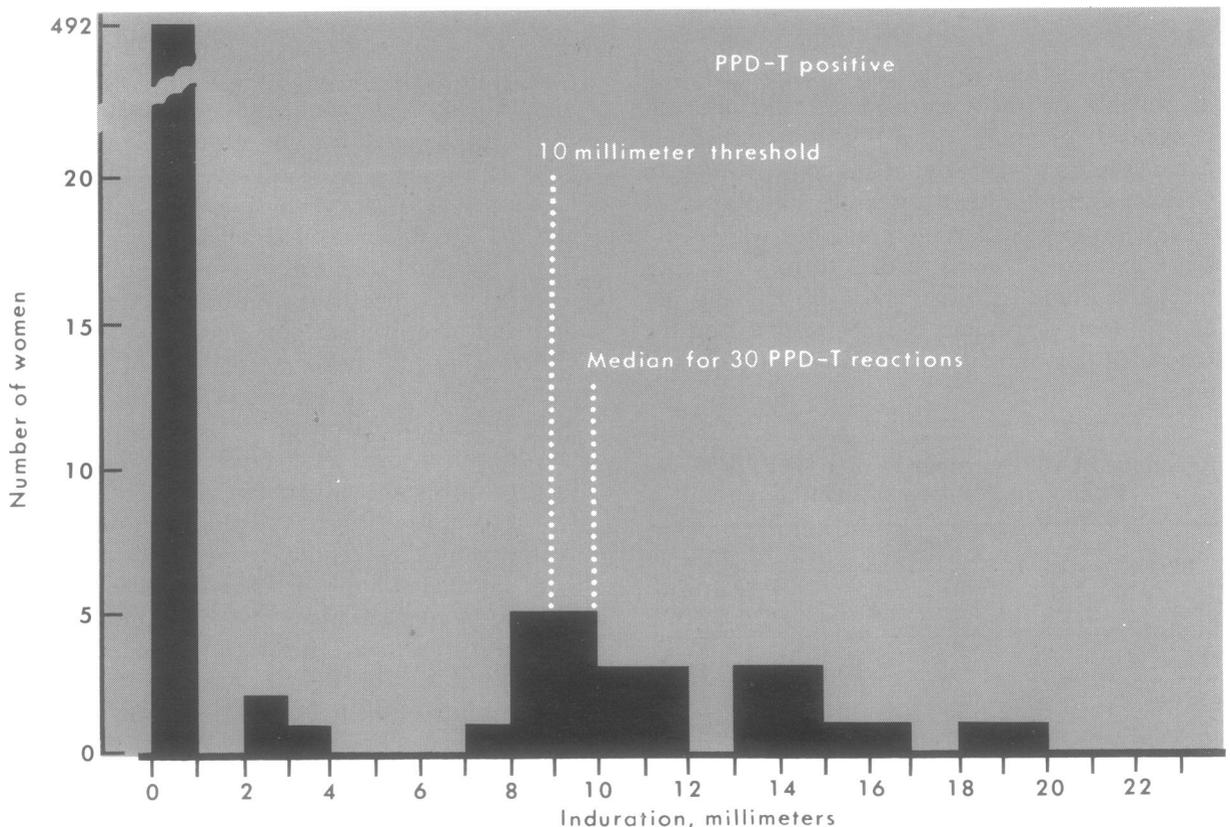
107 women, about one-fifth of the sample, are shown in the table.

Six women had PPD-T reactions in the doubtful range of 5-9 mm. When their corresponding PPD-T and PPD-B reactions were compared, however, tuberculous infection was revealed in four of the six women. In these four women, PPD-T had elicited a greater response than PPD-B. The 21 women who had PPD-T reactions of 10 mm. or more also had tuberculous infection.

In figure 1, which shows the results of testing 522 pregnant women with the two antigens, the corresponding PPD-T and PPD-B reactions are plotted according to diameters of induration. Measurable reactions to either PPD-T or PPD-B were not seen in 415 women. Of the 107 women who reacted measurably, 17 (of whom 14 had tuberculous infection) reacted to both PPD-T and PPD-B.

Battey PPD (PPD-B) reactions. As figure 2 shows, PPD-B elicited reactions in 94 women, 18 percent of the sample. The mean value was 8.4 mm. and median value was 9 mm. for the size of the PPD-B reactions.

Figure 3. Size and distribution of reactions of 522 pregnant women to 0.0001 mg PPD-T



Tuberculin PPD (PPD-T) reactions. Figure 3 shows that most (17 of 30) PPD-T reactions were distributed within 3 mm. of the 10 mm. threshold. (Of course, clustering this close to the 10 mm. threshold probably indicates some bias on the part of the recorder.) The mean value was 11.3 mm. and the median value was 11 mm. for the PPD-T reactions. The interval estimate for the median of the population was: $P(10 \text{ mm.} < M < 14 \text{ mm.}) = 0.9762$.

Discussion

Testing 522 indigent pregnant women who attended the Family Planning Clinic in New Orleans disclosed a 4.8 percent prevalence of tuberculous infection. As Palmer and Edwards (1) have suggested, a natural vaccination by atypical mycobacteria might have protected some of the women. Affronti (4) clearly demonstrated that *M. tuberculosis* and the atypical strains had some antigenic properties in common. And Siebenmann and Barbara (5) reported that, when used as vaccines, atypical mycobacteria of Runyon's groups, I, II, and III prolonged the lives of mice inoculated with virulent tubercle bacilli, H37Rv.

The dual technique of tuberculin testing proved particularly suitable for sampling the indigent pregnant women. Like other populations exposed to the atypical organisms (6, 7), the indigent pregnant women had a high prevalence of atypical mycobacterial infection. They also had a high proportion of small- and medium-sized tuberculin reactions, and, as Edwards (3) has noted, the dual technique provided the most precise method now available for distinguishing specific tuberculin PPD sensitivity from cross sensitivity (to tuberculin PPD) induced by atypical mycobacterial infection.

In fact, the comparison of responses to purified protein derivatives of *M. tuberculosis* and atypical mycobacterial (Battey) strains readily indicated which of the women with tuberculous infection had reactions in the doubtful range of 5–9 mm. These pregnant women, as well as those who had tuberculin PPD reactions of 10 mm. or more, were then considered for clinical investigation and, after delivery, for prophylactic treatment with isoniazid. Followup investigations disclosed that about half the women (13 of 25) had accepted chemoprophylaxis with isoniazid. The other women had either declined preventive treatment or

had left the hospital, without giving a traceable address, soon after their babies were born.

The 4.8 percent prevalence of tuberculous infection among indigent pregnant women was lower than the 7.9 percent previously reported (8) for naval recruits from the New Orleans area who had been considered to be at less risk from tuberculosis. The lower prevalence probably reflects a city-wide decline in tuberculous infection. Nonetheless, the pregnant women had a higher prevalence of infection than the children who attended the public and parochial schools of New Orleans (in 1970, less than 2 percent of the 1st, 6th, 8th, and 12th grade children had tuberculous infection). Thus, these women constituted a relatively high-risk population for whom vigorous tuberculosis control measures were indicated.

We therefore have continued to skin test the indigent pregnant women of New Orleans. Those who have tuberculous infection are now being encouraged to start chemoprophylaxis with isoniazid during the last trimester of their pregnancy. When the nurse renews their supply of isoniazid, at monthly intervals, she not only queries them about the presence of fever, jaundice, dark urine, and other possible adverse effects of their treatment but also stresses the need for their completing the course of chemoprophylaxis.

Similar tuberculin testing and chemoprophylaxis programs also include the contacts (families, friends, associates, and fellow employees) of tuberculous patients, as well as the personnel and patients of the Charity Hospital of Louisiana at New Orleans. Testing programs are also underway for students, teachers, and other employees of the primary and secondary schools in low-income areas of the city and for personnel and patients of the neighborhood health clinics in these areas. Since dual tuberculin testing is usually reserved for persons who have a doubtful (5–9 mm.) reaction to PPD-T, on a routine basis PPD-B is restricted to persons who have a doubtful reaction to PPD-T.

REFERENCES

- (1) Palmer, C. E., and Edwards, L. B.: Identifying the tuberculous infected. *JAMA* 205: 167–169, July 15, 1968.
- (2) Edwards, P. Q., and Colton, M. L.: Tuberculin testing. Tuberculosis Program, National Communicable Disease Center, Atlanta, Ga., July 7, 1969.
- (3) Edwards, P. Q.: Significance of the tuberculin test today. *Clin Notes Resp Dis* 8: 3–12, fall 1969.

- (4) Affronti, L. F.: Purified protein derivatives and other antigens prepared from atypical acid-fast bacilli and *Nocardia asteroides*. *Am Rev Tuberc* 79: 284-295, March 1959.
- (5) Siebenmann, C. O., and Barbara, C.: Immunologic relationships between typical and atypical mycobacteria as studied by means of the mouse protection test. *Am Rev Resp Dis* 89: 20-28, January 1954.
- (6) Edwards, P. Q., and Edwards, L. B.: Story of the tuberculin test—from an epidemiologic viewpoint. Ch. VIII. Search for the cause of tuberculin cross reactions. *Am Rev Resp Dis* 81 (supp.): 33-47, January 1960.
- (7) Hsu, K. H. K., Carreron, A. T., Jeu, F., and Jenkins, D. E.: Today's concept of the tuberculin test. *Dis Chest* 46: 648-664, December 1964.
- (8) Edwards, L. B., et al.: An atlas of sensitivity to tuberculin, PPD-B, and histoplasmin in the United States. *Am Rev Resp Dis* 99: 48-49, April 1969, pt. 2.
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BAILEY, WILLIAM C. (Department of Health of the City of New Orleans), THOMPSON, DORIS H., and GREENBERG, HARRY B.: *Indigent pregnant women of New Orleans require tuberculosis control measures. Health Services Reports, Vol. 87, October 1972, pp. 737-742.*

To appraise the prevalence of tuberculous infection among the indigent pregnant women of New Orleans and to determine their need for tuberculosis control measures, tests were performed on the indigent women who attended a parturition clinic. From June 8 through August 3, 1970, 522 women were given intradermal tests simultaneously, one on each forearm, with 0.0001 mg. of tuberculin PPD and Battey PPD. The dual (comparative) test technique was used to distinguish specific tuberculin

PPD sensitivity from cross sensitivity (to tuberculin PPD) induced by atypical mycobacterial infection.

Of the 522 women tested, 4.8 percent had tuberculous infection, but no tuberculous disease. A large proportion of the tuberculin PPD reactions were of small or medium size (sample median, 11mm.) Also, about 18 percent of the sample reacted to the atypical mycobacterial (Battey) antigen. However, comparing tuberculin PPD and Battey PPD responses identified the tubercu-

lous infected women who had reactions in the doubtful range of 5-9 mm.

Although lower than expected, the prevalence of tuberculous infection among the indigent pregnant women exceeded that of New Orleans public and parochial school children. The 4.8 percent prevalence of infection therefore indicated that the indigent pregnant women of New Orleans are a relatively high-risk population that requires active tuberculosis control measures.